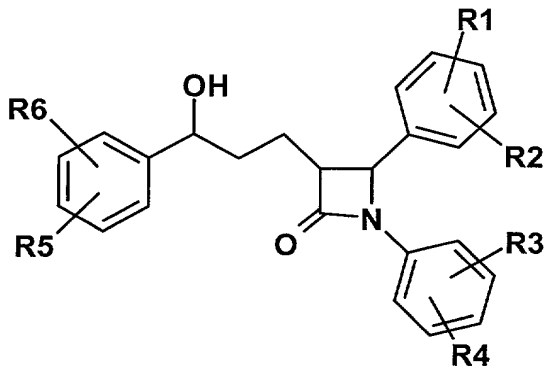
We claim:

1. A compound of the formula I,



I

or a pharmaceutically acceptable salt or ester thereof,
in which

R1, R2, R3, R4, R5, R6 independently of one another are $(C_0\text{-}C_{30})$-alkylene-(LAG), where one or more carbon atoms of the alkylene radical may be replaced by -O-, -(C=O)-, -CH=CH-, -C≡C-, -N($(C_1\text{-}C_6)$-alkyl)-, -N($(C_1\text{-}C_6)$-alkylphenyl)- or -NH-; or

H, F, Cl, Br, I, CF_3, NO_2, CN, COOH, $COO(C_1\text{-}C_6)$-alkyl, $CONH_2$, $CONH(C_1\text{-}C_6)$-alkyl, $CON[(C_1\text{-}C_6)\text{-alkyl}]_2$, $(C_1\text{-}C_6)$-alkyl, $(C_2\text{-}C_6)$-alkenyl, $(C_2\text{-}C_6)$-alkynyl or $O\text{-}(C_1\text{-}C_6)$-alkyl, where one, more or all hydrogens in the alkyl radicals may be replaced by fluorine; or

$SO_2\text{-}NH_2$, $SO_2NH(C_1\text{-}C_6)$-alkyl, $SO_2N[(C_1\text{-}C_6)\text{-alkyl}]_2$, $S\text{-}(C_1\text{-}C_6)$-alkyl, $S\text{-}(CH_2)_n$-phenyl, $SO\text{-}(C_1\text{-}C_6)$-alkyl, $SO\text{-}(CH_2)_n$-phenyl, $SO_2\text{-}(C_1\text{-}C_6)$-alkyl or $SO_2\text{-}(CH_2)_n$-phenyl, where n = 0 – 6 and the phenyl radical may be substituted up to two times by F, Cl, Br, OH, CF_3, NO_2, CN, OCF_3, $O\text{-}(C_1\text{-}C_6)$-alkyl, $(C_1\text{-}C_6)$-alkyl or NH_2; or

NH_2, NH-(C_1-C_6)-alkyl, N((C_1-C_6)-alkyl)$_2$, NH(C_1-C_7)-acyl, phenyl or O-$(CH_2)_n$-phenyl, where n = 0 – 6, where the phenyl ring may be mono- to trisubstituted by F, Cl, Br, I, OH, CF_3, NO_2, CN, OCF_3, O-(C_1-C_6)-alkyl, (C_1-C_6)-alkyl, NH_2, NH(C_1-C_6)-alkyl, N((C_1-C_6)-alkyl)$_2$, SO_2-CH_3, COOH, COO-(C_1-C_6)-alkyl or $CONH_2$;

(LAG) is a sugar residue, disugar residue, trisugar residue, tetrasugar residue; a sugar acid, an amino sugar;
an amino acid residue, an oligopeptide residue comprising 2 to 9 amino acids;
a trialkylammoniumalkyl radical; or -O-(SO_2)-OH;

wherein at least one of the radicals R1 to R6 has the meaning (C_0-C_{30})-alkylene-(LAG), where one or more carbon atoms of the alkylene radical may be replaced by -O-, -(C=O)-, -CH=CH-, -C≡C-, -N((C_1-C_6)-alkyl)-, -N((C_1-C_6)-alkylphenyl)- or -NH-, and where the radicals R1 and R2 may not have the meaning -O-sugar residue or -O-sugar acid.

2. A compound as claimed in claim 1, wherein

R1, R2, R3, R4, R5, R6 independently of one another are (C_0-C_{30})-alkylene-(LAG), where one or more carbon atoms of the alkylene radical may be replaced by -O-, -(C=O)-, -N((C_1-C_6)-alkyl)- or -NH-; or

H, F, Cl, Br, I, CF_3, NO_2, CN, COOH, COO(C_1-C_6)-alkyl, $CONH_2$, CONH(C_1-C_6)-alkyl, CON[(C_1-C_6)-alkyl]$_2$, (C_1-C_6)-alkyl, (C_2-C_6)-alkenyl, (C_2-C_6)-alkynyl or O-(C_1-C_6)-alkyl, where one, more or all hydrogens in the alkyl radicals may be replaced by fluorine; or
SO_2-NH_2, SO_2NH(C_1-C_6)-alkyl, SO_2N[(C_1-C_6)-alkyl]$_2$, S-(C_1-C_6)-alkyl, S-

$(CH_2)_n$-phenyl, SO-$(C_1$-$C_6)$-alkyl, SO-$(CH_2)_n$-phenyl, SO_2-$(C_1$-$C_6)$-alkyl or SO_2-$(CH_2)_n$-phenyl, where n = 0 – 6 and the phenyl radical may be substituted up to two times by F, Cl, Br, OH, CF_3, NO_2, CN, OCF_3, O-$(C_1$-$C_6)$-alkyl, $(C_1$-$C_6)$-alkyl or NH_2; or

NH_2, NH-$(C_1$-$C_6)$-alkyl, N$((C_1$-$C_6)$-alkyl$)_2$, NH$(C_1$-$C_7)$-acyl, phenyl or O-$(CH_2)_n$-phenyl, where n = 0 – 6 and the phenyl ring may be mono- to trisubstituted by F, Cl, Br, I, OH, CF_3, NO_2, CN, OCF_3, O-$(C_1$-$C_6)$-alkyl, $(C_1$-$C_6)$-alkyl, NH_2, NH$(C_1$-$C_6)$-alkyl, N$((C_1$-$C_6)$-alkyl$)_2$, SO_2-CH_3, COOH, COO-$(C_1$-$C_6)$-alkyl or $CONH_2$;

(LAG) is a sugar residue, disugar residue, trisugar residue, tetrasugar residue; a sugar acid, an amino sugar;
an amino acid residue, an oligopeptide residue comprising 2 to 9 amino acids;
a trialkylammoniumalkyl radical; or -O-(SO_2)-OH;

wherein at least one of the radicals R1 to R6 has the meaning $(C_0$-$C_{30})$-alkylene-(LAG), where one or more carbon atoms of the alkylene radical may be replaced by -O-, -(C=O)-, -N$((C_1$-$C_6)$-alkyl)- or -NH-, and where the radicals R1 and R2 may not have the meaning -O-sugar residue or -O-sugar acid.

3. A compound as claimed in claim 1, wherein

R1, R2, R3, R4, R5, R6 independently of one another are $(C_0$-$C_{30})$-alkylene-(LAG), where one or more carbon atoms of the alkylene radical may be replaced by -O-, -(C=O)-, -N(C_3)- or -NH-; or

H, F, Cl, Br, I, CF_3, NO_2, CN, COOH, COO$(C_1$-$C_6)$-alkyl, $CONH_2$, CONH$(C_1$-$C_6)$-alkyl, CON$[(C_1$-$C_6)$-alkyl$]_2$, $(C_1$-$C_6)$-alkyl, $(C_2$-$C_6)$-alkenyl,

$(C_2$-$C_6)$-alkynyl or O-$(C_1$-$C_6)$-alkyl, where one, more or all hydrogens in the alkyl radicals may be replaced by fluorine; or
SO_2-NH_2, $SO_2NH(C_1$-$C_6)$-alkyl, $SO_2N[(C_1$-$C_6)$-alkyl$]_2$, S-$(C_1$-$C_6)$-alkyl, S-$(CH_2)_n$-phenyl, SO-$(C_1$-$C_6)$-alkyl, SO-$(CH_2)_n$-phenyl, SO_2-$(C_1$-$C_6)$-alkyl or SO_2-$(CH_2)_n$-phenyl, where n = 0 – 6 and the phenyl radical may be substituted up to two times by F, Cl, Br, OH, CF_3, NO_2, CN, OCF_3, O-$(C_1$-$C_6)$-alkyl, $(C_1$-$C_6)$-alkyl or NH_2; or
NH_2, NH-$(C_1$-$C_6)$-alkyl, $N((C_1$-$C_6)$-alkyl$)_2$, $NH(C_1$-$C_7)$-acyl, phenyl or O-$(CH_2)_n$-phenyl, where n = 0 – 6 and the phenyl ring may be mono- to trisubstituted by F, Cl, Br, I, OH, CF_3, NO_2, CN, OCF_3, O-$(C_1$-$C_6)$-alkyl, $(C_1$-$C_6)$-alkyl, NH_2, $NH(C_1$-$C_6)$-alkyl, $N((C_1$-$C_6)$-alkyl$)_2$, SO_2-CH_3, COOH, COO-$(C_1$-$C_6)$-alkyl or $CONH_2$;

(LAG) is a sugar residue, disugar residue, trisugar residue, tetrasugar residue; a sugar acid, an amino sugar;
an amino acid residue, an oligopeptide residue comprising 2 to 9 amino acids;
a trialkylammoniumalkyl radical; or -O-(SO_2)-OH;

wherein at least one of the radicals R1 or R6 has the meaning $(C_0$-$C_{30})$-alkylene-(LAG), where one or more carbon atoms of the alkylene radical may be replaced by -O-, -(C=O)-, -$N(CH_3)$- or -NH-, and where the radicals R1 and R2 may not have the meaning -O-sugar residue or -O-sugar acid.

4. A compound as claimed in claim 1, wherein

R1, R2, R3, R4, R5, R6 independently of one another are
$-(CH_2)_{0\text{-}1}$-NH-$(C=O)_{0\text{-}1}$-$(C_3$-$C_{25})$-alkylene-$(C=O)_{0\text{-}1}$-$N(R7)_{0\text{-}1}$-LAG, where one or more carbon atoms of the alkylene radical may be replaced by

oxygen atoms, or

H, F, Cl, Br, I, CF_3, NO_2, CN, COOH, $COO(C_1-C_6)$-alkyl, $CONH_2$, $CONH(C_1-C_6)$-alkyl, $CON[(C_1-C_6)\text{-alkyl}]_2$, (C_1-C_6)-alkyl, (C_2-C_6)-alkenyl, (C_2-C_6)-alkynyl or $O-(C_1-C_6)$-alkyl, where one, more or all hydrogens in the alkyl radicals may be replaced by fluorine; or

SO_2-NH_2, $SO_2NH(C_1-C_6)$-alkyl, $SO_2N[(C_1-C_6)\text{-alkyl}]_2$, $S-(C_1-C_6)$-alkyl, $S-(CH_2)_n$-phenyl, $SO-(C_1-C_6)$-alkyl, $SO-(CH_2)_n$-phenyl, $SO_2-(C_1-C_6)$-alkyl or $SO_2-(CH_2)_n$-phenyl, where n = 0 – 6 and the phenyl radical may be substituted up to two times by F, Cl, Br, OH, CF_3, NO_2, CN, OCF_3, $O-(C_1-C_6)$-alkyl, (C_1-C_6)-alkyl or NH_2; or

NH_2, $NH-(C_1-C_6)$-alkyl, $N((C_1-C_6)\text{-alkyl})_2$, $NH(C_1-C_7)$-acyl, phenyl or $O-(CH_2)_n$-phenyl, where n = 0 – 6 and the phenyl ring may be mono- to trisubstituted by F, Cl, Br, I, OH, CF_3, NO_2, CN, OCF_3, $O-(C_1-C_6)$-alkyl, (C_1-C_6)-alkyl, NH_2, $NH(C_1-C_6)$-alkyl, $N((C_1-C_6)\text{-alkyl})_2$, SO_2-CH_3, COOH, $COO-(C_1-C_6)$-alkyl or $CONH_2$;

R7 is H or CH_3;

(LAG) is a sugar residue;

where one of the radicals R1 or R3 has the meaning $-(CH_2)_{0-1}-NH-(C=O)_{0-1}-(C_3-C_{25})$-alkylene-$(C=O)_{0-1}-N(R7)_{0-1}$-LAG, where one or more carbon atoms of the alkylene radical may be replaced by oxygen atoms.

5. A pharmaceutical composition comprising one or more of the compounds as claimed in claim 1 and a pharmaceutically acceptable carrier.

6. A pharmaceutical composition comprising one or more compounds as claimed in claim 1 and at least one further active compound.

7. A pharmaceutical composition as claimed in claim 6, comprising, as a further active compound, one or more compounds that normalize lipid metabolism.

8. A pharmaceutical composition as claimed in claim 6, comprising, as a further active compound, one or more antidiabetics, hypoglycemically active compounds, HMGCoA reductase inhibitors, cholesterol absorption inhibitors, PPAR gamma agonists, PPAR alpha agonists, PPAR alpha/gamma agonists, fibrates, MTP inhibitors, bile acid absorption inhibitors, CETP inhibitors, polymeric bile acid adsorbers, LDL receptor inducers, ACAT inhibitors, antioxidants, lipoprotein lipase inhibitors, ATP citrate lyase inhibitors, squalene synthetase inhibitors, lipoprotein(a) antagonists, lipase inhibitors, insulins, sulfonyl ureas, biguanides, meglitinides, thiazolidindiones, α-glucosidase inhibitors, active compounds which act on the ATP-dependent potassium channel of the beta cells, CART agonists, NPY agonists, MC4 agonists, orexin agonists, H3 agonists, TNF agonists, CRF agonists, CRF BP antagonists, urocortin agonists, β3 agonists, MSH (melanocyt-stimulating hormone) agonists, CCK agonists, serotonin-reuptake inhibitors, mixed serotonin and noradrenergic compounds, 5HT agonists, bombesin agonists, galanin antagonists, growth hormones, growth hormone-releasing compounds, TRH agonists, decoupling protein 2- or 3-modulators, leptin agonists, DA agonists, lipase/amylase inhibitors, PPAR modulators, RXR modulators or TR-β-agonists or amphetamines.

9. A method for the treatment of impaired lipid metabolism, which comprises administering to a host in need of the treatment an effective amount of at least one compound as claimed in claim 1.

10. A method as claimed in claim 9, wherein the host suffers from impaired lipid metabolism.

11. A method for the treatment of hyperlipidemia, which comprises administering

to a host in need of the treatment an effective amount of at least one compound as claimed in claim 1.

12. A method as claimed in claim 11, wherein the host suffers from hyperlipidemia.

13. A method for controlling the serum cholesterol concentration in a host, which comprises administering to the host in need of the control of serum cholesterol concentration an effective amount of at least one compound as claimed in claim 1.

14. A method for treating insulin resistance, which comprises administering to a host in need of the treatment an effective amount of at least one compound as claimed in claim 1.

15. A method as claimed in claim 14, wherein the host suffers from insulin resistance.

16. A method for the treatment of an arteriosclerotic manifestation, which comprises administering to a host in need of the treatment an effective amount of at least one compound as claimed in claim 1.

17. A method as claimed in claim 16, wherein the host suffers from an arteriosclerotic manifestation.